REMARKS

1. Discussion with the Examiner

Applicants' representatives appreciated the opportunity to discuss the pending application with Examiner Eric Silverman on April 24, 2007. During the discussion, Applicants' representatives pointed out to Examiner Silverman that the Office Action dated December 27, 2006, had examined only claims 1-4, even though claims 1–4 had been cancelled and claims 5–19 had been added in a Preliminary Amendment filed on October 10, 2003. Examiner Silverman confirmed that the Preliminary Amendment had been made of record in the file of the application. Therefore, claims 5-19 are pending in the application.

Given that none of the pending claims in the application were examined in the December 27, 2006 Office Action, Applicants respectfully request withdrawal of the Office Action.

2. Information Disclosure Statement

Applicants have filed concurrently herewith an Information Disclosure Statement ("IDS") and a List of References Cited by Applicant. Applicants have also submitted copies of McCusker *et al.*, "Nomenclature of Structural and Compositional Characteristics of Ordered Microporous and Mesoporous Materials With Inorganic Hosts (IUPAC Recommendations 2001)," *Pure & Appl. Chem.* vol. 73, no. 2, pp. 381–394 (2001) ("the IUPAC article"); and H. Garcia, "Photoresponsive Porous Organosilicas," *Pure & Appl. Chem.* vol. 75, no. 8, pp. 1085–1090 (2003) ("the Garcia article").

3. Amendments to the Specification

The specification has been amended to correct certain typographical errors. Specifically, the symbol for ruthenium has been changed from "Re" to "Ru." Also, the spelling of the metal has been corrected to "chromium" from "chrome." Applicants submit that these errors would have been readily apparent to one of ordinary skill in the art. Therefore no new matter has been added with these amendments.

4. Claim Amendments

Claims 5–19 were pending in the application. Claims 5–7, 13–18, and 20 have been amended, and new claim 20 has been added. Support for the claim amendments is found in the originally filed specification, including the claims. No new matter has been added with this amendment. Upon entry of the present amendment, claims 5–20 will be pending. Following is Applicants' response to the issues raised by the Examiner in the order

in which they appear in the Office Action.

5. The Pending Claims Are Not Indefinite

The Office Action rejected claims 2–4 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Claims 1–4 had been cancelled in a Preliminary Amendment dated October 10, 2003, which obviates the rejection. Furthermore, Applicants have amended pending claims 6 and 7 to replace the typographical error "chrome" with the correct spelling of the metal "chromium." Also, none of pending claims 5-20 include the tilde symbol (~). Therefore, Applicants submit that pending claims 5–20 are not indefinite under 35 U.S.C. § 112, second paragraph.

6. Art Rejections

The Office Action provisionally rejected claims 1–4 on the grounds of nonstatutory obviousness-type double patenting over claims 1–4 of copending Application No. 10/542,168. The Office Action also rejected claims 1–3 under 35 U.S.C. § 103(a) as allegedly being obvious over United States Patent No. 3,891,574 to Kobayashi *et al.* ("Kobayashi") in view of KR 1999-0080808 to Hong *et al.* ("Hong '808"). Finally, the Office Action rejected claims 1–4 under 35 U.S.C. § 103(a) as allegedly being obvious over United States Patent No. 3,531,265 to Dille *et al.* ("Dille") in view of Hong '808. Applicants respectfully traverse.

The Obviousness-Type Double Patenting Rejection Should Be Withdrawn

Claims 1–4 were provisionally rejected on the grounds of nonstatutory obviousness-type double patenting over claims 1–4 of copending Application No. 10/542,168. However, claims 1–4 had been cancelled in a Preliminary Amendment dated October 10, 2003. Therefore, Applicants respectfully submit that these rejections have been obviated, and should be withdrawn.

The Claims Are Not Obvious Over Kobayashi In View Of Hong '808

Pending independent claim 5 has been amended to clarify that the nano carbon ball for deodorization comprises a mesoporous shell and a hollow core. The mesoporous shell comprises carbon. Also, the nano carbon ball is impregnated with at least one metal composition that may be a transition metal, a transition metal oxide, an alkali metal salt, or any mixtures thereof. Support for the amendments to claim 5 is found in the originally filed specification, for example, at p. 3, ll. 10–21; p. 6, ll. 15 – p. 7, ll. 3; and p. 10, ll. 8–10.

Therefore no new matter has been added with this amendment.

Applicants respectfully submit that neither Kobayashi nor Hong '808 teach or suggest Applicants' claimed metal-impregnated nano carbon balls, because both of these references are directed to systems of activated carbon. As Applicants pointed out in the specification, activated carbon is a microporous structure. *See* application, *e.g.*, p. 3, ll. 17–19. According to the notation recommended by the International Union of Pure and Applied Chemistry (IUPAC), a microporous materials has pores with diameters mainly less than 2 nm, which are called micropores. *See* the IUPAC article, *e.g.*, p. 382, paragraph 3. As Applicants have explained in the application, the impregnated activated carbon disclosed in Hong '808 performs poorly compared to Applicants' metal-impregnated nano carbon balls, because the deodorizing ability of activated carbon tends to deteriorate due to clogging of the fine micropores. *See* application, *e.g.*, p. 3, ll. 14–19. Since Kobayashi's hollow spheres are also composed of activated carbon, then Kobayashi's hollow spheres would face a similar problem of performance deterioration due to clogged micropores, regardless of whether these micropores are located inside or outside the hollow sphere. *See* Kobayashi, *e.g.*, Abstract, col. 3, ll. 66 – col. 4, ll. 9, and col. 4, ll. 37-42. In contrast, Applicants' nano carbon ball comprises a mesoporous shell. According to the IUPAC notation, the diameters of the pores in a mesoporous structure range mainly from 2 nm to 50 nm. *See* the IUPAC article, *e.g.*, p. 382, paragraph 3. As Applicants have explained in the disclosure, Applicants' metal-impregnated nano carbon balls exhibit superior deodorizing capabilities compared to impregnated systems of activated carbon, in part, because of their mesoporous structure. *See* application, *e.g.*, p. 3, ll. 12–25. Indeed, Applicants' metal-impregnated nano carbon balls overcome the limitations of impregnated activated carbon, in part, because the mesopores would not tend to become clogged like the micropores.

Applicants also submit that the combination of Kobayashi with Hong '808 does not render Applicants' claimed nano carbon balls obvious. The Office Action cites Kobayashi for the teaching of hollow carbon spheres. However, Applicants' metal-impregnated nano carbon balls would not be rendered obvious based on the disclosure of Kobayashi's hollow spheres of activated carbon. Applicants' nano carbon balls are mesoporous structures, which were first reported in 1991 by researchers of the Mobil Oil Company. *See* the Garcia article, *e.g.*, p. 1085, paragraph 1. The Kobayahi patent was issued in 1975, well before mesoporous structures were first synthesized. Therefore, Kobayashi's disclosure does not provide any of the teachings of the advantages of Applicants' nano

carbon balls, which are based, in part, on their mesoporous structure. As a result, one of ordinary skill in the art would not be motivated to realize the benefits of Applicants' metal-impregnated nano carbon balls based on the teachings of Kobayashi's hollow spheres of activated carbon. Furthermore, the disclosure in Hong '808 of impregnating microporous activated carbon systems does not cure the deficiencies of Kobayahi. Therefore, Applicants submit that the combined teachings of Kobayahi and Hong '808 do not render Applicants' claimed metal-impregnated nano carbon balls obvious. Accordingly, for at least these reasons, pending claims 5-20 are not obvious under 35 U.S.C. § 103(a) over the combination of Kobayahi and Hong '808.

The Claims Are Not Obvious Over Dille In View Of Hong '808

Applicants also submit that the combination of Dille and Hong '808 does not render Applicants' claimed metal-impregnated nano carbon balls obvious. The Office Action cites Dille for the teaching of "carbon spheres which are hollow and porous." *See* Office Action, *e.g.*, p. 5, ll. 10. However, Dille's disclosure dates back to the 1960s. As explained above, the first reports of the synthesis of mesoporous structures date back to only 1991. Therefore, Dille's hollow, porous carbon spheres do not necessarily possess a mesoporous structure. A *prima facie* case of obviousness can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed product. *See In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); *see also* MPEP § 2112.01. As Applicants have explained, Dille's hollow, porous carbon spheres do not necessarily possess a mesoporous structure. Thus, any *prima facie* case that the Examiner may assert based on a presumption of similarity between Dille's hollow, porous carbon spheres and Applicants' nano carbon balls is rebutted. *See In re Best*, 562 F.2d 1252, 1255 (CCPA 1977); MPEP § 2112.01. *Id.* Furthermore, Dille's disclosure does not provide any teachings of the advantages of Applicants' nano carbon balls, which are based, in part, on their mesoporous structure. Therefore, one of ordinary skill in the art would not be motivated to realize the benefits of Applicants' metal-impregnated nano carbon balls based on the teachings of Dille. In addition, the disclosure in Hong '808 of impregnating microporous activated carbon systems does not cure the deficiencies of Dille. Therefore, Applicants submit that the combined teachings of Dille and Hong '808 do not render Applicants' claimed metal-impregnated nano carbon balls obvious. Accordingly, for at least these reasons, pending claims 5-20 are not obvious under 35 U.S.C. § 103(a) over the combination of Dille with Hong '808.

CONCLUSION

Applicants respectfully request that the foregoing amendments and remarks be made of record in the file of the above-identified application. Applicants believe that each ground for rejection has been successfully overcome or obviated, and that all pending claims are in condition for allowance. Withdrawal of the rejections, and allowance of the application, are respectfully requested. If any issues remain in connection herewith, the Examiner is respectfully invited to telephone the undersigned to discuss the same.

No fee is believed due in connection with this response. In the event that a fee is required, please charge any such fees to Jones Day Deposit Account No. 50-3013.

Respectfully submitted,

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